currents. In particular, it fails to take into account the relations known to exist between the general permeability of the plasma membrane and the demarcation-current potential. Evidence from many sides shows that this potential varies with the permeability of the plasma membrane to simple crystalloid substances, decreasing as this permeability increases. All cytolytic (*i. e.*, permeability-increasing or membranolytic) substances and processes, so far as known, diminish this potential. Such facts indicate very clearly that semi-permeable membranes form a fundamental if not the chief factor in the production of the demarcation-current potential, and hence also in the production of the action-current which is evidently due to a variation in this potential. Any sufficient reversible increase in permeability would produce under these conditions a negative variation. Obviously, numerical data are required for a decision of those questions. It is not unlikely that several distinct factors are involved in the production of the action-current, and that the observed effect is an additive one. The potential of the action-current is said often to exceed that of the demarcation-current, a fact inexplicable on the simple membrane theory. But if an electrical variation due to a chemical change of the kind imagined by Pauli were superposed on one due to altered membrane-permeability, such an effect might conceivably result.

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Marine Biological Laboratory,
September 1, 1912

SCIENTIFIC BOOKS

Physik in graphischen Darstellungen. Von Felix Auerbach. Leipzig, B. G. Teubner. 1912. Large 8vo.

In recent years Professor Auerbach has been devoting himself, with success, to encyclopedic treatises on physics. It is not so long since he published his excellent "Kanon der Physik." But the present book is decidedly more novel in design. It will, in particular, be invaluable to teachers. It lends itself at once to the construction of lantern slides for the graphic illustration of involved points in theory. It is furthermore an aid to the setting of graphic problems in all parts of the subject. In a lecture course on light, for instance, almost all the answers to questions can be given by graphs. Such an exercise is easily corrected on the one hand, while on the other it is exceedingly difficult for the student to answer the question by mere copying. It has therefore always seemed to the writer that a similar body of questions, carried throughout the whole of physics, all of them to be answered graphically, would meet many of the difficulties now encountered in case of a lecture course. It is probable that Auerbach's book is a definite contribution in this direction and that a systematic course of questions, to be answered by drawing, may be put together by means of it.

Among the great variety of diagrams and constructions given, all of about the same importance, it will only be possible to refer to a few at random. Thus the curious representation of dimensional formulæ obtained by laying off the powers of *c, g, s,* in terms of length, breadth and thickness, is new to the writer. Graphic classification of different orders of standard magnitude in physics, as, for instance, the prominent distances, times, velocities, densities, etc., occurring in mechanics and the vast number of data in other parts of physics, are bound to be convenient for reference. Constructions relating to equipotential surfaces and lines of force are given in familiar diagrams, but the plates contain suggestive cases of graphic statics, including standard trusses. Similarly the velocity and acceleration hodographs adduced are cleverly chosen. The representation of the cylindroid, however, seems to the writer inadequate.

The subject of elastics both on its experimental and theoretical side lends itself admirably to graphic treatment, and a great variety of constructions is given, including impact, viscosity, hardness, etc. In hydrodynamics the plates abound in practical applications of the subject, in addition to the many exhibits of flow for cases of both rotational and irrotational motion. Waves are particularly well illustrated and the final develop-

ment of the subject embraces the molecular properties of liquids. The kinematics of harmonic motion is reproduced by an extensive collection of typical cases, after which follows a very full treatment of the graphics of acoustics. The information which is here brought together is extraordinarily rich.

Thermal phenomena are now so extensively known that the graphic method seems almost necessary for their classification. Particularly in the broad subject of solution such a method seems to be the only one adequately available and Auerbach has made full use of it.

The diagrams in electricity are as a rule more familiar, though Auerbach has not failed to introduce much of the recent progress, as in radiology, for instance. Finally, in the section of optics he has had the advantage of long residence in Jena. Throughout the book, in fact, the charts relating to the properties of the Jena glasses are very satisfactory. At the same time the progress there made in optical theory is fully recorded.

The book contains 213 pages and on the average three or four graphs to the page. It concludes with a brief description of the charts together with the necessary bibliographical notes and an index. The charts are throughout up to date, both in their theoretical and experimental references. In looking them over one obtains, perhaps, a more vivid impression of the noble accomplishments of modern physics than can be given by any other method.

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How to Use the Microscope, a Guide for the Novice. By the Rev. CHARLES A. HALL. 25 text-figures and 20 full-page plates. London, Adam & Charles Black; New York, The Macmillan Company. 75 cents net.

The purpose of this book is well expressed by the author when he says: "It is a guide for the novice, and I have not presumed to offer advice to the expert microscopist." The seven chapters of the book limit themselves to what the novice can really do to start with in microscopic work. Once fairly started, the world is all before him.

In Chapter I. the simple microscope, its advantages and use, are described, and what is said is wholly commendable. In the second chapter there is a discussion of the compound microscope, and the author tells from his own experience how any one can construct a compound microscope. In the third chapter is a general discussion of the use of the compound microscope and the excellent advice given to learn the advantages of low powers. The fourth chapter tells of some important accessories like the substage condenser and the polariscope and the stage micrometer. Coming to the fifth chapter, the real work begins with some common objects for microscopic study. The student is shown where to find them in ponds and ditches, in rock pools of the sea, in the flower pots of the home, in the garden and fields and in the great insect world. He is directed how to prepare and study the things collected, and good books are mentioned which will give fuller information.

In the sixth chapter directions are given for preparing objects and mounting them permanently. This includes mounting objects dry, mounting insects whole in balsam, making sections of plant tissues, staining and mounting them; and finally the making and mounting of rock sections. The seventh and last chapter deals with the method of making photographs of microscopic objects, and the examples of photomicrographs by the author which illustrate his book furnish excellent models.

A critical reading of the book shows that it is unusually free from errors. Its advice is good and one feels sure that it comes from one who has been over the ground many times and has learned the good ways. It seems admirably adapted for the beginner in England. For the beginner in any other country it is not so well adapted, as it tells only of the optical goods, etc., to be had of the London opticians, and the beginner would naturally suppose that he must have the identical things mentioned, at any rate he would know of no